

RESPONSE TO HICKMAN'S COMMENTARY

We appreciate the opportunity to respond to James C. Hickman's comments regarding our paper (Madroño 39:271–280, 1992) which we submitted with the hope that it would stimulate further research on *Chorizanthe valida* S. Watson and the management issues associated with grazing.

When we began this study, we were concerned that grazing by cattle might have a negative impact on *C. valida* and that successful management would require elimination of grazing. As our field observations progressed we came to a different point of view because populations declined in our exclosures and we were successful in establishing *C. valida* under grazing conditions (Table 2). In fact, our unpublished data for 1992 indicate that one of the introduction plots (Plot Y) now has 443 plants on the original 2 × 2 m plot with an additional 316 plants outside the introduction plot. Thus, not only has the existing colony been perpetuated for over a century under a cattle grazing regime, but at least one new colony was established and is expanding in the presence of grazing.

Hickman raises many issues, but these points are raised as applicable to *C. valida* with no supporting data. In fact, the Jepson Manual section on *Chorizanthe*, authored by Hickman, states *C. valida* is "threatened by cattle," again with no supporting data. We are more inclined to agree with Stebbins assessment of the genus as a "pioneer on xeric sites where little or no competition with other plants would occur." Grazing, as practiced on the existing colony, favors the maintenance of open, xeric sites with reduced competition.

We would certainly agree that more research is needed regarding seed production, but low densities are of concern. On eight of the 16 non-grazed sub-plots, *C. valida* reproduction failed entirely and on two of the sub-plots there was only one *C. valida*. The only reason the summary values for the exclosures reached the reported level, is that one of the exclosure plots (four sub-plots) still had 51 plants.

Seed success is apparently greater on grazed than on non-grazed plots. The seed yield from the non-grazed plots in 1989 could easily be 45,000 seeds/m². Of that number only 8/m² (0.02%) grew to maturity. A few meters away, on the grazed plots the seed yield was about 8000 seeds/m² and 228/m² (2.8%) grew to maturity. The grazed plots were on the same soil type and were subjected to the same weather conditions. Introduction plots (Table 2) give information consistent with that from the established grazed plots. The summer of 1989 counts for the introduction plots indicate successful seedling establishment values of approximately 3.8%, 2.2% and 9.8% under grazing treatment.

We are not aware of seed-bank studies on this species. Hickman suggests that since there was low density on the ungrazed plots, there is probably considerable seed storage. Liam Davis grew *C. valida* under greenhouse conditions in an attempt to develop information regarding germination and seedling survival. Hickman misinterpreted our communication on this topic by stating that we found germination to be difficult. Survival rates were low, but germination in vitro was approximately 80%.

Hickman states that small stature indicates a harsher environment (trampling). We have seen no evidence in the field to support that assumption. We did not anticipate the plasticity of *C. valida*, so no size measurements were taken and we don't know why the plants in the grazed area are smaller. Figure 3A typifies *C. valida* in the grazed plots and we did not observe any obvious changes in the uniformly small stature of these plants over five years. Other collections from this grazed colony (Howell 1980 CAS) demonstrate comparable size. We suspect the difference in stature is due to the effect of shade on the non-grazed sites. Greenhouse studies may answer this question.

Hickman also states that high numbers of an annual indicate that the study area must be a marginal (stressful) environment. In his correspondence he suggested that the "significant rebound" in the exclosures from 1990 to 1991 might be due to *C. valida* competing "less well under lush conditions." This is consistent with his premise, but not consistent with our unpublished observations. If anything, our data suggest that *C. valida* does better under wetter conditions, but our entire study occurred during the 1986–1992 drought.

With regard to management, our concern is that managers are more inclined to respond to recognition of responsibility for an endangered plant by rushing to remove grazing. We have personally observed declines in populations of *Blennosperma bakeri* Heiser following its recognition as endangered and its subsequent "protection" from grazing. Range managers recognize that many annual herbs survive in pasturelands only because potential competitive species that might overtop them are held in check by grazing. Also, there are many coastal pasturelands where *Baccharis pilularis* DC. has come to dominance following removal of grazing. *B. pilularis* occurs on the *C. valida* study site and could easily overgrow much of the colony in a few years without grazing. We conclude, therefore, that *C. valida* is probably not threatened, but favored, by the existing grazing regime and that reductions in grazing should only be undertaken with extreme caution.

—LIAM H. DAVIS and ROBERT J. SHERMAN.

ANNOUNCEMENT

THE RUPERT BARNEBY AWARD

The New York Botanical Garden is pleased to announce that Mr. David Clarke, of the University of Illinois, Urbana is the recipient of the 1992 Rupert Barneby Award. Mr. Clarke will use the award to complete a taxonomic treatment of *Acacia* series *Gummiferae* of the Caribbean, both as part of his graduate thesis and as a contribution to the Flora of the Greater Antilles.

The New York Botanical Garden also invites applications for the 1993 Rupert Barneby Award. The award of \$1,000.00 is to assist researchers planning to come to the New York Botanical Garden to study the rich collection of Leguminosae. Anyone interested in applying for the award should submit their curriculum vitae, a letter describing the project for which the award is sought, and how the collection at NYBG will benefit their research. Travel to NYBG should be planned between January 1, 1994 and January 31, 1995. The letter should be addressed to Dr. Enrique Forero, Director, Institute of Systematic Botany, The New York Botanical Garden, Bronx, NY 10458-5126, USA, and received no later than December 3, 1993. Announcement of the recipient will be made by December 17. Anyone interested in making a contribution to THE RUPERT BARNEBY FUND IN LEGUME SYSTEMATICS, which supports this award, may send their check, payable to The New York Botanical Garden, to Dr. Forero.